



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,591	03/29/2004	Donghui Lu	42P19023	2696
45209	7590	12/03/2008	EXAMINER	
INTEL/BSTZ			STOUTER, KELLY M	
BLAKELY SOKOLOFF TAYLOR & ZAFMAN LLP			ART UNIT	
1279 OAKMEAD PARKWAY			PAPER NUMBER	
SUNNYVALE, CA 94085-4040			1792	
			MAIL DATE	
			DELIVERY MODE	
			12/03/2008	
			PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/811,591

Applicant(s)

LU, DONGHUL

Examiner

KELLY STOUFFER

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 21-27 is/are pending in the application.
4a) Of the above claim(s) 21-27 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-11 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☒ Claim(s) 21-27 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 22 January 2008 has been entered.

Election/Restrictions

Newly submitted claims 21-27 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 21-27 are drawn to an apparatus separately classified in 118/715 from the original claims, and their search would be an undue burden on the examiner. Further, the method can be used with another and materially different apparatus such as one that does not include a nitride etch stop layer or any of the other specific applications of the layer.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 21-27 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Response to Arguments

It is noted that the applicant states on page 5 of the arguments filed 22 January 2008 that claim 9 is cancelled. However, in the claims, claim 9 was not cancelled. Therefore, the 35 USC 112 1st paragraph rejection of claim 9 is maintained and repeated here.

Applicant's arguments filed 22 January 2008 have been fully considered but they are not persuasive. The applicant argues that Maes does not teach the elements of claim 1, in particular that it does not teach introducing a deposition gas after applying the plasma power and does not teach an RF frequency generated plasma.

However, in the passage cited in the previous office action – column 5 lines 22-43 of Maes – Maes discloses that the silicon source gas may be pulsed into a continuous flow of nitrogen radicals. This reads on the claim limitation of introducing a deposition gas (silicon) after applying plasma power, as applying plasma power occurs without deposition gas in between pulses. The flow of radicals, or plasma, is continuous in Maes in column 5 lines 40-43. Nitrogen radicals provided to the chamber (column 5 lines 25-30) read on the limitation of applying plasma power to a PECVD chamber, at least as broadly as it is recited in the claims, the chambers ie deposition chamber or the entire chamber including a remote plasma generator is included with the word “chamber”. Further, generating a plasma by RF frequency is common in the plasma deposition arts. See, for example, paragraphs 0008, 0031 of Nguyen et al. Therefore, the 35 USC 103 (a) rejections of the claims are maintained and repeated here.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is uncertain how one of ordinary skill in the art would be able to move nitrogen fixtures relative to the substrate as it is written in claim 9. The breadth of claim 9, citing moving two fixtures relative to the substrate, is more specific than the disclosure. The nature of the invention is a coating process and does not include extensive apparatus information. The state of the prior art is such that moving a fixture, such as a showerhead, relative to a substrate is not common and how one would accomplish moving said fixture is not predictable based upon prior art, nor would it be predictable to one of ordinary skill in the art at a graduate level. The applicant only provides "moving equipment that was acting on the wafer" as the amount of direction for the limitations in claim 9, and does not provide working examples of this limitation. One of ordinary skill in the art would therefore have to undergo an undue amount of experimentation to make or use the invention based upon the content of the disclosure.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent number 6818517 to Maes in view of US Patent publication 2004015845 to Nguyen et al.

Regarding claims 1 and 2, Maes discloses applying plasma power to form a film by generating plasma and flowing a deposition gas during the plasma deposition simultaneously or in pulses. The nitride is deposited and the plasma power is shut off. (Column 5 lines 22-43) Maes does not include this layer as part of a first portion of a layer then repeating this process to form a second layer. Nguyen et al. teaches depositing a first portion of a layer then repeating the process to form a second layer

(abstract, Figure 4 and paragraph 0049) during a process that offers advantages over the method of Maes including lower temperature reactions for modern semiconductor processing (paragraph 0004), to deposit films of high coverage on a not-flat substrate such as vias or trenches in semiconductors (paragraph 0010), minimize process time and enhance film quality (paragraph 0049).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Maes to include the nitride layer as part of a first portion of a layer then repeating this process to form a second layer as taught by Nguyen et al. in order to take advantage of lower temperature reactions for modern semiconductor processing, to deposit films of high coverage on a not-flat substrate such as vias or trenches in semiconductors, minimize process time and enhance film quality. Further, Nguyen et al. teaches RF power as a common power source for generating plasma in paragraphs 0008 and 0031.

Regarding claim 3, Maes uses silane as a deposition gas in column 5 line 31.

Regarding claim 4, Maes discloses that silane may be pulsed during the nitrogen plasma deposition. One of ordinary skill in the art would recognize the capability of the first pulse or any pulse thereafter occurring at least more than 0.5 seconds after applying the plasma.

Regarding claim 5, Maes includes by reference in entirety US patent 6544900 to Raaijmakers et al. that includes the silane gas flowing through process chamber 12 in Figure 2 before being removed by a vacuum pump.

Regarding claims 6 and 7, Maes discloses using nitrogen and ammonia as plasma gases in column 5 lines 23-46. In addition, one of ordinary skill in the art would recognize that a plasma of nitrogen as disclosed by Maes would not be possible without initiating a gas flow to start the plasma.

Regarding claims 8 and 11, Nguyen et al. discloses purging after each step of depositing parts of the film and depositing parts of the film until the desired thickness, or complete film, is reached, in Figure 4.

Regarding claim 10, Raaijmakers et al. includes a chamber that is equipped to process many substrates (Figure 1) that would include the capability of moving the substrates in between processing steps.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KELLY STOUFFER whose telephone number is (571)272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer
Examiner
Art Unit 1792

kms

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792